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ALTERNATIVE ENLISTMENT STANDARDS

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Robert F. Lockman

CENTER FOR NAVAL ANALYSES

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This paper examines alternative enlistment standards to increase the supply of recruits while maintaining current retention standards. The use of additional ASVAB tests, changes in waiver policy, equivalency diploma quality measures, and separate SCREENS for A school and apprenticeship trainees are studied as possible policies to increase recruit supply.

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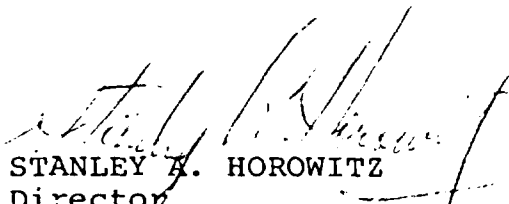1 JAN 73
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ALTERNATIVE ENLISTMENT STANDARDS

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SUMMARY

In this paper, the possibility of employing alternative enlistment standards to increase the supply of recruits to the Navy was examined. Four types of changes to current standards were analyzed. They include using tests from the ASVAB not currently included in the AFQT as additional predictors of retention, analyzing the value of various types of enlistment waivers, using measures of the quality of high school equivalency diplomas, and screening Class A school and apprenticeship trainees separately. All of these changes in enlistment standards would be low-cost initiatives.

No large benefits to using additional ASVAB tests to screen recruits are found. However, current waiver policies should be maintained and perhaps expanded somewhat as a partial answer to future manpower shortfalls. Adjusting eligiblity requirements to allow for measures of GED quality could lead to small increases in supply as well. More efficient matching of Class A school guarantees and attendance could lead to increases in recruit retention. Finally, separate screening of Class A school and apprenticeship trainees has potential for cost savings for the Navy.

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ALTERNATIVE ENLISTMENT STANDARDS

BACKGROUND

The Manpower Availability Study seeks to help the Navy expand the enlisted manpower pool by qualifying more applicants for service and retaining them longer. This goal is important to the Navy as it faces the decline of young males eligible for military service and an increase in manpower requirements in the 1980s.

The four tasks in the study are to:

1. Examine alternative enlistment standards that may permit more applicants to be recruited and retained in naval service,

2. Develop first-term survival curves that show the expected months of service as a function of recruit background characteristics. These curves might replace today's SCREEN table, which shows only expected chances of completing the first year of service (reference 1),

3. Verify and extend rating assignment procedures designed in an earlier CNA study to increase first-term retention by rating, and

4. Explore the effects of pay and quality of life factors on first-term and career reenlistments.

This report deals with the first task of examining alternative enlistment standards.

ASVAB Tests

On 1 October 1981, a new, renormed Armed Services Vocational Aptitude Battery (ASVAB) containing 10 tests was implemented at the Armed Forces Entrance and Examining Stations for high school testing. The Armed Forces Qualification Test (AFQT) portion of ASVAB used in qualifying applicants for enlistment also was changed. Only six current tests excluding those in the AFQT are contained in the new ASVAB. These tests are unlikely to be compromised and, if they prove useful for predicting retention, could unobtrusively substitute for the AFQT.

Enlistment Waivers

There are different degrees of gravity for enlistment waivers: they range from waivers of physical or mental qualifications to minor traffic offenses, pre-service drug abuse, non-minor misdemeanors, and felonies. If certain of these waivers show no

deleterious effects on retention, other things equal, their use might be expanded.

Educational Quality

Can variations in quality of high school diploma or equivalency (the GED test) be captured and related, along with other selection measures, to retention? If educational quality variables correlate higher with retention than simply years of education, diploma, or high school equivalency, they could replace or supplement them.

Navy Schooling

The first-term survival of graduates of Navy Class A schools is higher than that of recruits who do not attend Class A school. Some recruits with school guarantees do not graduate from A school, while some with no school guarantees do. The combinations of school guarantees or not, and school graduation or not, produce widely varying loss rates. Men with guarantees who do not graduate from A school have a first-year loss rate much higher than that of men who have guarantees and graduate. They have an even higher rate then men with no guarantees who do not attend school. Consequently, information on the likely training disposition of recruits could be useful in classifying recruits to ratings to reduce attrition.

CANDIDATE SELECTION MEASURES

We are concentrating on recruit selection measures covering the ASVAB-AFQT, educational quality, waivers, and prospective Navy training. Other measures, such as age at enlistment and dependency status, will be used as controls. The data base came from the cohort of non-prior-service males who joined the regular Navy in CY 1977. These men were followed for two years to determine their training and survival experience. Because this cohort contains a wider than normal range of quality, it is particularly useful for studying availability as a function of background measures under different selection criteria.

ASVAB

The old and new ASVAB tests are compared in table 1. Only six non-AFQT tests are contained in the old and new versions:

    MK - math knowledge
    MC - mechanical comprehension
    GS - general science
    EI - electronic information ⎫
    AI - automotive information ⎬ now combined into one test
    SI - shop information   ⎭

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The AFQT portion of ASVAB formerly was the sum of:

WK - word knowledge
AR - arithmetic reasoning
SP - spatial perception.

The new AFQT version contains WK, AR, NO (numerical operations) and a new PC (paragraph comprehension) test combined as $WK + AR + PC + \frac{NO}{2}$. Because our data base is from CY 1977, we are limited to using the six surviving non-AFQT measures in searching for alternative selection measures to increase manpower availability.

TABLE 1

OLD AND NEW ASVAB TESTS

Forms 5, 6, 7 (pre FY 1981)	Forms 9, 10, 11 (FY 1981)
WK*	WK*
AR*	AR*
SP*	--
AD	CS
NO	NO*
MK	MK
MC	MC
GS	GS
GI	--
EI	EI
AI	
	AS
SI	
	PC*

---

*AFQT components.

Waivers

Over 25 percent of the CY 1977 recruits enlisted with waivers. The distribution of these waivers ranked by degree of gravity is shown in table 2 for men with school guarantees and for men in the Seaman/Airman/Fireman program.

TABLE 2

TYPES OF WAIVERS
GRANTED TO CY 77 MALE USN RECRUITS

	Percent of waivers granted	
	All SGs Quebecs	S/A/F
Felonies	<1	<1
Non-minor misdemeanors	4	5
Pre-service drug abuse	10	11
Minor traffic offenses	3	3
Physical/mental qualifications	5	8
Total waivers	22	27

The majority of waivers granted are for reasons of relatively minor importance. If they are unrelated to survival, there would be no reason not to increase their use. Even if they had a moderately negative relation to retention, all things considered, a need for recruits might justify expanding their use. No such argument can be made for felonies and non-minor misdemeanors, at least on prima facie grounds.

High School Education Level

We wanted to classify recruits' ZIP codes into different geographic/socioeconomic categories as proxies for high school quality. With 36,000 residential ZIPs (even though most recruits come from half that number) and a sizeable cost to develop the classification scheme, the process became unwieldy.

Our next plan was to obtain rankings of American high schools by the average SAT or ACT scores achieved by their students. This plan was stymied by the fractionation of authority for releasing scores.

Finally, we turned to average annual current expenditures per pupil by state as a proxy measure of educational quality for diploma graduates (reference 2). The categories of these expenditures are shown in table 3. These expenditures should be adjusted to account for differences in the cost of living among the states. Because state by state data on the Consumer Price Index was not

available, the expenditure variable is a very crude proxy for quality of high school educaiton. (That is obvious to begin with because of the wide range of high school quality <u>within</u> states.) However, the measure was cheap to get and can be discarded if it does not work.

TABLE 3

STATE CATEGORIES OF ANNUAL CURRENT EXPENDITURE PER PUPIL IN AVERAGE DAILY ATTENDANCE, 1977-78

Alaska	Connecticut	Arizona
New York	Montana	Indiana
D.C.	Oregon	Missouri
New Jersey	Rhode Island	New Hampshire
Delaware	California	South Dakota
Maryland	Kansas	Texas
Massachusetts	Colorado	Utah
Pennsylvania	Florida	West Virginia
Illinois	Ohio	Alabama
Hawaii	Vermont	Kentucky
Wisconsin	Virginia	North Carolina
Iowa	Louisiana	South Carolina
Michigan	Maine	Arkansas
Minnesota	Nebraska	Georgia
Washington	Nevada	Idaho
Wyoming	New Mexico	Mississippi
	North Dakota	Tennessee
	Oklahoma	

Number	16	18	17
$(000)	$2.0-2.5*	$1.5-1.9	$1.2-1.4
Range	0.5	0.4	0.2

_____

*$3.3 for Alaska.

High School Equivalency (GED)

The General Educational Development (GED) test is used by all states and D.C. to grant high school equivalency. It is actually a total of five tests covering writing and reading skills, social studies, science, and mathematics (reference 3).

The states have different standards for passing the GED, expressed as a minimum score on the separate tests and/or a minimum

average score. The scores are standard scores with a mean of 50 and a standard deviation of 10, just like the Navy standard scores on ASVAB tests.

The state criteria, obtained from reference 4, are shown in table 4. Four states (Delaware, Florida, Maryland, and Utah) have the highest passing standards: a minimum score of 40 on each of the five tests and a minimum average score of 45. At the other extreme, six states (Alabama, Alaska, Louisiana, Montana, South Dakota, and West Virginia) require minimum separate or minimum average scores of 35 or 45. We classified all the state and D.C. criteria into four categories of decreasing difficulty shown in table 4. These categories will be used as variables for recruits with GEDs according to their state of residence. Recruits with other high school equivalencies, such as certificates of completion or attendance, will be assigned to the GED category in which their state appears.

Prospective Navy Training

Recruits in the CY 1977 cohort entered the Navy under five enlistment programs. The first is for apprenticeship training; the rest are for Class A school training:

    S/A/F - Seaman/Airman/Fireman
    PSI - Programmed School Input
    OS - Occupational Specialty
    SG - School Guarantee
    6 YO - Six-year obligor (NF, AEF, ATF)

The first-year survival experience of men in these programs, according to whether or not they graduated from Class A schools during that first year, is described in table 5.

Survival in recruit training increases from the S/A/F to the 6 YO program. Among graduates of recruit training who graduate from A school, the first-year survival rate for each enlistment program exceeds 90 percent. However, graduates who did not graduate from A school have a sizeably lower survival rate that declines from the S/A/F to the 6 YO program. In a sense, the higher the school entry qualifications, the less likely a qualified recruit is to survive if he does not graduate from the A school.

Recruiters, of course, cannot know whether or not enlistees will graduate from schools for the programs in which they qualified at the recruiting station. However, the predicted chances of doing so can be incorporated into any selection or screening table that shows expected survival experience.

TABLE 4

GED SCORE QUALIFICATION CATEGORIES BY STATE

Minimum score and/or minimum average score[a]

			40 or 45 (3) 40 or 50 (2) 40 on each (1)	
40 & 45	35 & 45		45 average (2)	35 or 45
Del.	Ariz.	Minn.	Miss.	Ala.
Fla.	Ark.	Mo.	Neb.	Alaska
Md.	Calif.	Nev.	Tex.	La.
Utah	Colo.	N.M.		Mont.
	Conn.	N.J.	N. Mex.	S.D.
	D.C.	N.Y.	N.D.	W. Va.
	Ga.	N.C.		
	Haw.	Ohio	Ore.	
	Ida	Okla.		
	Ill.	Pa.	S.C.	
	Ind.	R.I.	Tenn.	
	Ia.	Vt.		
	Kan.	Va.		
	Ky.	Wash.		
	Me.	Wisc.		
	Mass.	Wyo.		
	Mich.			
4	33		8	6

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[a] Minimum standard score on each of the 5 GED tests and/or minimum average standard score for all 5 tests.

TABLE 5

FIRST YEAR SURVIVAL EXPERIENCE
PER 100 QUEBECS BY PROGRAM ENLISTED
FOR AND CLASS A SCHOOL ATTENDANCE

	INPUT	RTC		A SCHOOL			No A SCHOOL		
		LOSS	GRAD	ATT.	%LOSS1	%SURV1	No.	%LOSS1	%SURV1
S/A/F	100	17	83	29	9	91	54	14	86
PSI	100	12	88	64	2	98	24	23	77
OS	100	10	90	81	7	93	9	40	60
SG	100	8	92	85	4	96	7	38	62
6 YO	100	5	95	91	5	95	4	51	49

ANALYSIS OF ALTERNATIVE SELECTION MEASURES

Alternative selection measures and control measures to be evaluated against first year retention cover:

- ASVAB tests and AFQT permutations,

- waivers and educational quality indicators, and

- Class A school attendance.

The controls include

- educational level,

- Delayed Entry Program and Program Enlisted For,

- age and presence of dependents upon entering active duty, and

- race.

Approach

The overall plan for analyzing the candidate selection variables calls for successive substitution of different AFQT and ASVAB

measures in a model containing the remaining candidate and control variables:

Step	ASVAB/AFQT
1	Mental group
2	AFQT percentile rank
3	AFQT 3 tests
4	6 non-AFQT ASVAB tests

First-year survival will be the measure of performance. Separate analyses will be conducted for Seaman/Airman/Fireman and recruits in school guarantee programs.

The projected recruiting and attrition costs and manpower availability benefits of promising solutions relative to today's SCREEN standards will be evaluated in the heterogeneous CY 1977 cohort. A similar process was used in setting the qualifying score for SCREEN, which was developed on the same cohort (reference 1, pp. 13-15).

Model

Estimates of the probability that a recruit will survive his first year of service are derived by tracking recruits who entered the Navy in 1977. Data from the Enlisted Master Records are examined to determine if an individual has survived his first twelve months of service. Table 6 provides the mean values of the loss rate and other variables for those recruits entering with program guarantees and those without guaranteed A-school. These populations are apparently different and therefore all analysis will be done separately for each group. Probit analysis is used to determine those individual characteristics and Navy policies that affect survival rates. The definitions of all variables are presented in table 7.

Typically, analysts use Least Squares Regressions to estimate the impact of independent variables such as personal characteristics on a dependent variable, in this case whether or not a recruit survives his first twelve months of service. When, as in this instance, the dependent variable is qualitative, taking on only the value of one or zero, techniques such as probit analysis are more appropriate. Numerous CNA publications have used this, or similar, approaches, and the advantages of probit analysis over regression are discussed in these and other places (see references 5 and 6). Therefore, only a brief description of probit analysis is included here.

For each individual a loss variable is observed. Let this variable, L_i, equal 1 if individual i leaves the service within

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TABLE 6

MEANS OF VARIABLES FOR SEAMAN/AIRMAN/FIREMAN
AND SCHOOL GUARANTEE RECRUITS

	S/A/F (percent)	School guarantees (percent)
LOSS1	24.2	12.8
WHITE	80.4	88.9
BLACK	14.2	8.7
OTHER RACE	5.4	2.4
DEP	52.6	88.0
DEP MOS[a]	2.11	4.29
MARRIED	3.2	3.9
SG	−	44.5
OS	−	21.1
PSI	−	7.0
6YO	−	27.3
WAIVER	28.4[b]	22.8[b]
MINOR	2.8	3.2
N−MIN MD	4.9	3.8
FELONY	0.9	0.6
DRUG ABUSE	11.0	10.0
OTHER WVR	8.3	4.8
HSDG	50.1	76.9
GED	7.1	7.5
POST HIGH	1.0	2.8
AGE 17	24.5	15.8
AGE 18	34.8	40.2
AGE 19	19.6	19.0
AGE 20+	21.1	25.0
AFQT	41.0	67.1
MG1	0.2	2.5
MG2	4.7	24.7
MG3U	6.6	18.5
MG3L	34.3	37.0
MG4	54.1	17.2
MG5	0.1	0
ASCH COMP	21.8	78.6
Number	24,955	42,235

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[a]Mean months for those who participate in the Delayed Entry Program.

[b]Due to coding errors, the five subcategories of waivers do not add exactly to total waivers.

TABLE 7

DEFINITIONS OF VARIABLES

Variable	Definition
WHT	1 if the recruit is white; 0 otherwise
DEP	1 if the recruit is in the Delayed Entry Program; 0 otherwise
DEPMOS	Number of months entry was delayed
MARRY	1 if recruit is married; 0 otherwise
WVR	1 if recruit entered on a waiver; 0 otherwise
MINOR	1 if recruit entered on a waiver for minor misdemeanor; 0 otherwise
NMinMd	1 if recruit entered on a waiver for non-minor misdemeanor; 0 otherwise
FELONY	1 if recruit entered on a waiver for a felony; 0 otherwise
ABUSE	1 if recruit entered on a waiver for drug or alcohol abuse; 0 otherwise
OTH WVR	1 if recruit entered on a waiver for any other reason; 0 otherwise
HSDG	1 if the recruit earned a high school diploma; 0 otherwise
GED	1 if the recruit earned a GED certificate; 0 otherwise
POST HIGH	1 if recruit has education beyond HSG; 0 otherwise
AGE17	1 if the recruit is Age 17 or less; 0 otherwise
AGE20P	1 if the recruit is Age 20 or more; 0 Otherwise
AFQT	Percentile rank on AFQT test
MG1	1 if the recruit is in Mental Group 1; 0 otherwise
MG2	1 if the recruit is in Mental Group 2; 0 otherwise
MG3U	1 if the recruit is in Mental Group 3 Upper; 0 otherwise
MG3L	1 if the recruit is in Mental Group 3 Lower; 0 otherwise
MG4	1 if the recruit is in Mental Group 4; 0 otherwise
MG5	1 if the recruit is in Mental group 5; 0 otherwise
A School	1 if the recruit graduated from A School; 0 otherwise
LOSS1	1 if the recruit lost during first 12 months; 0 0 otherwise

twelve months and 0 if he stays. Variables representing an individual's characteristics and Navy policies are included in a vector, X_i. A probit model then estimates

$$P(L_i = 1) = \int_{\beta'X_i}^{\infty} f(a)da \qquad (1)$$

where β is a vector of coefficients to be estimated and f is the standard normal distribution function.

Coefficients estimated from the probit analysis are not easily interpretable, and the effect of any independent variable on the loss probability depends on the value of all other independent variables. To assess the impact on losses of a change in an independent variable, two values of this variable can be substituted into equation (1) holding all other X's constant and the difference computed. This difference is not unique, however, and depends on the values assigned to the X vector. In this report, whenever the change in the loss probability for a change in an independent variable is estimated, the value of the other independent variables will be noted.

RESULTS

Test Scores

The results of probit analysis from four models are shown in appendix A.[1] The models are identical except for the way in which mental ability is measured. The first model uses mental group,[2] while the second substitutes the actual AFQT score from which mental groups are derived. The third and fourth models include individual ASVAB test scores: the three tests that constitute the ASVAB-5,6,7 AFQT composite, and the six tests not included in the AFQT which are still contained in ASVAB-8,9,10.

Mental groups are useful in predicting survival probabilities (appendix A tables 1 and 2). Their coefficients are statistically significant and follow the expected pattern of higher groups having lower loss rates than the lower ones (MG 4B, 4C, 5). Table 8 converts the probit coefficients into percentage changes. Differences

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[1]Losses include both those during and after RTC.

[2]Mental group assignments correspond to renormed test scores (see, reference 9) and differ from mental groups to which recruits were originally assigned.

in retention rates from the top to the bottom mental group are ten
percentage points for school guarantee high school graduates and
fifteen percent for non-guarantees. Non-graduates display a some-
what larger difference between top and bottom mental groups.

TABLE 8

ESTIMATES OF CHANGES IN SURVIVAL PROBABILITY
FOR MENTAL GROUPS

	Survival Probability	
	SG	S/A/F
WHT, DEP=3 Mos, Marry=Waivers=0,		
Age 17-19, HSG, MG3L	(86.8)	(84.2)
MG1	4.7	8.9
MG2	3.7	3.8
MG3U	1.5	2.8
MG4A	-2.7	-2.6
MG4B-5	-5.6	-6.3

Mental group categories require somewhat arbitrary assign-
ments. An alternative is to use the actual AFQT percentile as a
continuous measure of mental ability. As expected, higher AFQT
scores are associated with lower loss rates (appendix A, tables 3
and 4). Table 9 indicates that a ten-point increase in the AFQT
percentile rank leads to a three-percentage point increase in
survival for non-guarantees and approximately half that for school
guarantee recruits.

For the recruit cohort used in this analysis, the AFQT score
was a composite of three tests (WK, AR, SP). Probits using the
three separate tests are shown in appendix A, tables 5 and 6. For
the school guarantees, one of the coefficients is of the wrong sign
but all other coefficients are significant and indicate increased
survival with higher test scores. Table 10 converts the probit
coefficients into percentage point changes. Individual test scores
are normed to have mean fifty and a standard deviation of ten, so
that table 10 represents the effect of a one standard deviation
increase on a test.

Six tests from the ASVAB that were not included in the AFQT
score are analyzed in appendix A, tables 7 and 8. These tests tend
to have the correct sign with a few exceptions, one being the

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TABLE 9

ESTIMATES OF CHANGES IN SURVIVAL PROBABILITY
FOR AFQT SCORES

	Survival Probability	
	SG	S/A/F
WHT, DEP=3 Mos, Marry=Waivers=0, Age 17-19, HSG, AFQT=50	(85.3)	(80.5)
AFQT = 30	-3.7	-6.6
40	-1.8	-3.2
60	1.6	2.9
70	3.1	5.5

TABLE 10

ESTIMATES OF CHANGES IN SURVIVAL PROBABILITY
FOR AFQT ASVAB TESTS

	Survival Probability	
	SG	S/A/F
WHT, DEP=3 Mos, Marry=Waivers=0, Age 17-19, HSG, WK=AR=SP=50	(87.0)	(80.3)
WK = 60	-0.3	1.5
AR = 60	1.3	2.6
SP = 60	1.0	0

Electronics Information test which has a positive and significant coefficient for school guarantees. Table 11 presents the results in percent changes. Thus, ASVAB tests not currently included in the AFQT may be useful as additional or alternative predictors of survival in recruit screening.

As a test of the predictive power of alternative ASVAB tests, separate SCREENs were created using the AFQT score and non-AFQT tests. Table 12 presents the results of applying each SCREEN to the actual 1977 cohort. They suggest that the two approaches are comparable in predictive power. Only very minor differences exist in the number of recruits admitted when both SCREENs use a cutoff score of 70, and the survival rates for the remainder of the cohort are virtually identical.

Probably other combinations of AFQT and non-AFQT ASVAB tests could be employed to gain slight improvements in the efficiency of the SCREEN. Nonetheless, any improvements would be slight and would require validation on additional recruit cohorts. Our results imply that there is little to be gained in recruit retention by employing additional ASVAB tests in the current SCREEN.

Waivers

Approximately 25 percent of all recruits enter the Navy on waivers. If recruits with waivers exhibit survival rates comparable to other recruits, then the Navy can maintain this policy or expand its use as a way to increase the pool of eligible recruits. In addition to measuring loss rates, measures of disciplinary problems were also examined to see if waivered recruits performed as well as other recruits.

Waivers were divided into five categories. The first three involved criminal behavior of varying severity: minor misdemeanors, predominantly traffic offenses, non-minor misdemeanors, and a relatively small group of individuals with felony convictions. The fourth and largest waiver category contains recruits with some history of drug or alcohol abuse, largely individuals who have admitted to experimental use of marijuana and not those with criminal drug convictions. The final category includes recruits with physical waivers, low test on SCREEN scores, and all other waivers not elsewhere classified. The two final waiver types account for 70 percent of all recruit waivers.

The results of probit analysis using all five waiver categories are presented in appendix A, tables 9 and 10. For school guarantees, none of the coefficients are statistically different from zero. For the non-guarantees, the two waiver types unrelated to unlawful behavior show statistically significant increases in survival rates. Table 13 presents the percentage changes in survival

TABLE 11

ESTIMATES OF CHANGES IN SURVIVAL PROBABILITY
FOR NON-AFQT ASVAB TESTS

	Survival Probability	
	SG	S/A/F
WHT, DEP=3 Mos, Marry=Waivers=0, Age 17-19, HSG, Tests=50	(86.6)	(80.1)
MK = 60	1.8	2.6
EI = 60	-1.2	1.2
MG = 60	1.1	0.8
GS = 60	0.6	1.2
SI = 60	0.7	-0.2
AI = 60	-0.3	-0.4

TABLE 12

COMPARISON OF ALTERNATE SCREENS
AFQT vs. ASVAB TEST SCORES
(Cut score 70)

	% qual.	#	Endstrength	Survival rate
Guarantees				
AFQT	91.6	38,700	33,600	86.7%
ASVAB	89.9	38,000	33,000	86.9
Non-guarantees				
AFQT	68.7	17,200	13,200	77.1%
ASVAB	69.6	17,400	13,400	77.2

probabiity and average measures of disciplinary actions and desertion rates for each waiver type.

TABLE 13

ESTIMATES OF CHANGES IN SURVIVAL PROBABILITIES AND AVERAGE BEHAVIOR PROBLEMS FOR WAIVER TYPES

SCHOOL GUARANTEES

	Percent	Percent Change in survival chances	Desertion	Discipline
No waiver	77	-	3.6	3.9
Physical/mental	5	-0.3	3.6	4.0
Substance abuse	10	-0.1	5.0	5.2
Minor mis-demeanor	4	-0.7	5.5	5.8
Non-minor	3	0.8	6.9	7.6
Felony	<1	2.4	9.5	10.3

NON-GUARANTEES

	Percent	Percent Change in survival chances	Desertion	Discipline
No waiver	72	-	7.7	7.7
Physical/mental	8	1.4	6.6	6.5
Substance abuse	11	1.7	8.5	8.1
Minor mis-demeanor	3	-0.3	10.5	10.2
Non-minor	5	-0.6	12.9	12.9
Felony	1	-1.7	7.3	11.0

Recruits with waivers for unlawful activity display slightly higher loss rates and higher rates of behavior problems. Among the school guarantees, waivered recruits from the other two categories are very comparable to non-waivered recruits, except for a slightly higher incidence of behavior problems for drug waivers. For the non-guarantees, recruits from the other two waiver groups had a statistically significant increase in survival probability with no substantial difference in behavior problems.

Current Navy recruiting policy allows an applicant who has 'experimented' with drugs to enter on a waiver, so that there appears to be little room for expansion of this program. Absent any further evidence on performance problems, however, there is strong support for continuation of this policy. The physical/mental category of waivers is a potential area for expansion. Previous efforts (references 7 and 8) have detailed the potential for

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changes in physical standards in the military. Our work does not provide sufficient information to allow specific recommendations about the types of allowances that might be made to admit more recruits, but confirms that the potential for expansion of these kinds of waivers exists.

At current levels, recruits with waivers for law violations have both higher loss rates and more behavior problems than other recruits, but the differences are not dramatic. If manpower shortages become severe, these types of waivers may be a source of additional recruits. It is probable, however, that as waivers are increased recruiters will be less selective, leading to a deterioration in the quality of recruits granted waivers.

GED and Other HS Equivalents

To assess the impact of varying standards for GED certificates on recruit selection, recruits with GEDs or equivalents were assigned to one of four categories based on the stringency of the GED requirements in their state of residence. Category 1 includes the four states with the most difficult requirements and category 4 the easiest. Category 2 encompasses the majority of recruits. For the school guarantees all GED variables are statistically significant as are two of four for the non-guarantees (see appendix A, tables 11 and 12).

Table 14 presents the percentage differences in survival for the different GED groups. There is a consistent pattern of increased survival with increased requirements for achieving a passing grade on the test. For the guarantees, group 1 displays a survival rate comparable to HSGs with all other groups being somewhat lower. Among the non-guarantees, there is a much wider range of survival rates with the lowest categories being similar to or even a little worse than non-graduates.

These results suggest that there may be small gains to the Navy by treating GEDs from different states differently in the SCREEN. For example, it might be desirable to treat GEDs from category 1 states as if they had a diploma, or to treat non-guarantee GEDs from categories 3 and 4 as non-graduates. Another approach might be to obtain actual GED test scores and let the Navy choose its own pass/fail criterion. In either case, the number of potential recruits affected would be small, and the administrative and political costs could outweigh the benefits of any policy change.

Class A School

Attendance at a Class A school is an important predictor of retention. The survival chances of a recruit are clearly improved if he attends an A School. The results of probits on first year loss for boot camp survivors are contained in appendix A, tables 13

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and 14. Table 14 displays the survival rates for A school graduates and non-graduates. Not all recruits who attend an A school actually complete the program, but results using A school attendance in place of completion look very similar.

TABLE 14

ESTIMATES OF CHANGES IN SURVIVAL PROBABILITY FOR GED QUALITY

| | Survival Probability | |
	SG	S/A/F
WHT, DEP=3 Mos, Marry=Waivers=0, Age 17-19, MG3L, NHS	(72.6)	(71.8)
Post HSG	12.2	11.4
HSG	14.4	11.8
GED 1	14.2	7.9
GED 2	8.6	4.9
GED 3	6.2	2.4
GED 4	8.8	-2.1

As can be seen in table 15, the effect of an A school is much more dramatic for guarantees then for non-guarantees. Completing an A school program increaes a recruit's survival chances by 17 percentage points for guarantees, other things equal. The impact is smaller for non-guarantees, but still substantial (seven percentage points).

These results suggest that the Navy might be able to lower its first-year loss rate simply by lowering the number of school guarantees while maintaining the current number of A school slots. It is not clear, however, whether this policy would have a large adverse impact on recruiting or whether those denied guarantees would exhibit RTC loss rates as high as current non-guarantees. The results of probit analysis with A school attendance as the dependent variable is presented in appendix A, table 15 for the recruits with guarantees. The significant differences in attendance for the three RTCs suggest that improvements in administration could lead to a better match between guarantees and attendance that would result in improvements in retention.

Separate SCREENs for A School Guarantees and Non-Guarantees

As a final task, we examined the possibility of using separate SCREENs for school guarantees and non-guarantees (apprenticeship trainees). This is a preliminary effort to assess the impact of

creating a separate apprenticeship recruiting program with its own
SCREEN.

TABLE 15

A SCHOOL EFFECTS ON SURVIVAL
CHANCES OF RTC GRADUATES

GUARANTEES (8% RTC LOSS)

	% Survival	Mean (%)
A school completed	97	85
Not completed	80	15

NON-GUARANTEES (18% RTC LOSS)

A school completed	95	27
Not completed	88	73

Tables 16 and 17 display the SCREEN tables constructed for
guarantees and non-guarantees. Note that a substantial proportion
of non-guarantees actually attend an A school, so that the non-
guarantee SCREEN may be somewhat different from a SCREEN which
would be constructed solely for apprentices.

There is a possibility of gain from using separate SCREENs.
Table 17 provides a preliminary cost-benefit analysis of a separate
screening policy. As higher screen scores are employed, more
potential recruits are made ineligible. This requires an increase
in the number of applicants at an additional cost. By raising the
survival rate of the cohort, however, there is a reduction in the
number of recruits lost. This reduction in total billets leads to
savings which may offset the increased recruiting cost.

Although the results in table 18 are sensitive to the cost
data employed they do suggest that employing different SCREEN
scores may lead to savings. In this case the maximum savings are
achieved with a cutoff score of 75 for guarantees and 65 for non-
guarantees. In addition, these results may understate the savings
to the Navy. As the cutoff score for school guarantees is
increased, some of those who become ineligible may join without a
guarantee, leading to an additional decrease in recruiting costs.
Also, if, as we expect, retention rates are correlated with perfor-
mance, then by increasing cutoff scores we also can increase the
quality of the recruit cohort.

TABLE 16

1st YEAR SCREEN FOR SCHOOL GUARANTEES

	HSG		GED		No HSG	
	17-19	20+	17-19	20+	17-19	20+
MG1	94	93	90	89	86	84
MG2	92	91	88	86	83	80
MG3U	91	89	86	84	80	77
MG3L	90	88	85	82	78	75
MG4A	87	85	81	79	74	71
MG4B-5	87	84	81	78	74	70

TABLE 17

1st YEAR SCREEN FOR NON-GUARANTEES (APPRENTICES)

	HSG		GED		No HSG	
	17-19	20+	17-19	20+	17-19	20+
MG1	93	91	89	88	86	84
MG2	88	86	83	80	78	76
MG3U	87	84	81	79	77	74
MG3L	84	81	78	75	73	70
MG4A	81	79	75	72	69	66
MG4B-5	77	75	70	67	65	61

TABLE 18

EFFECTS OF CHANGING SCREEN SCORES

GUARANTEES (34,700 ENDSTRENGTH)

Score	% Qual.	# Disqual	Add'l recruits	Loss reduc-tion	Savings[a]	Add'l[b] recruit cost	Net
70	100	--	--	--	--	--	--
75	97	1200	950	250	2.2	1.9	.3
80	90	3900	3200	700	6.1	6.8	-.7

NON-GUARANTEES (17,300 ENDSTRENGTH)

Score	% Qual.	# Disqual	Add'l recruits	Loss reduc-tion	Savings	Add'l recruit cost	Net
60	100	--	--	--	--	--	--
65	92	1900	1400	500	2.8	1.3	1.5
70	77	5400	4500	900	5.0	5.1	-.1

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[a] @ 8,700 per loss guarantee.
   5,600 per loss non-guarantee.

[b] @ 3,500 for 1-3U HSG.
   1,500 for 4 HSG.

CONCLUSIONS

Four approaches to increasing the supply of recruits to the Navy were examined. All are inexpensive policies which could be used to ameliorate potential manpower shortages in the 1980s. Recommendations from these results are:

- There are no large benefits to using additional ASVAB tests in creating a SCREEN. Nonetheless, in future test batteries additional consideration for the value of tests as predictors of survival should be given.

- Current waiver policies should be maintained. There is a potential for increasing the use of waivers, particularly those that do not involve legal infractions, as a partial answer to manpower shortfalls.

- Adjusting eligibility requirements to allow for measures of GED quality could lead to small increases in supply. If adequate measures of high school quality can be

obtained, they should be examined as a potential source of further refinement in the screening process.

- A more efficient matching of A school guarantees and attendance should be attempted. In addition, further analysis of separate screening programs for A school and apprenticeship trainees is desirable.

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APPENDIX A

PROBIT RESULTS

TABLE A-1

PROBITS FOR SCHOOL GUARANTEES WITH MENTAL GROUP

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.254	5.76	--
Wht	.072	2.90	88.8
Dep	-.106	4.53	87.5
Depmos	-.036	13.12	3.75
Marry	.183	4.99	3.9
Waiver	.179	.99	22.9
PHS	-.422	8.57	2.9
HSG	-.526	24.93	76.6
GED	-.286	9.07	7.5
Age 20P	.146	7.60	25.0
MG1	-.487	7.73	2.5
MG2	-.423	11.06	24.6
MG3U	-.306	7.92	18.4
MG3L	-.231	6.42	37.0
MG4A	-.113	2.91	12.9
-2LLR	1580.6		
DF	14		
N	42235		
Mean DV	14.7		

TABLE A-2

PROBITS FOR NON-GUARANTEES WITH MENTAL GROUP

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.437	15.35	--
Wht	.129	5.53	80.4
Dep	-.045	2.17	52.6
Depmos	-.021	3.85	1.11
Marry	.204	4.23	3.2
Waiver	-.005	.26	28.4
PHS	-.303	3.20	1.0
HSG	-.374	18.51	50.1
GED	-.160	4.52	7.1
Age 20P	.090	3.81	21.1
MG1	-.713	2.91	0.2
MG2	-.407	8.60	4.7
MG3U	-.356	8.60	6.6
MG3L	-.233	9.87	34.3
MG4A	-.130	5.48	28.3

-2LLR	617.5		
DF	14		
N	24955		
Mean DV	27.1		

TABLE A-3

PROBITS FOR SCHOOL GUARANTEES WITH AFQT

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.064	1.60	--
Wht	.070	2.82	88.8
Dep	-.094	3.98	87.5
Depmos	-.036	13.21	3.74
Marry	.183	4.96	3.9
Waiver	.014	.76	22.9
PHS	-.416	8.37	2.9
HSG	-.518	24.49	76.6
GED	-.285	8.99	7.5
AFQT	-.0074	15.26	67.0
Age 20P	.150	7.77	25.0

-2LLR	1567.6
DF	10
N	42235
Mean DV	14.7%

TABLE A-4

PROBITS FOR NON-GUARANTEES WITH AFQT

DV = 1 yr Loss

Variable	MLE	t	Mean
C	.054	1.46	--
Wht	.134	5.85	80.4
Dep	-.043	2.09	52.6
Depmos	-.029	5.45	1.11
Marry	.293	6.23	3.2
Waiver	-.044	2.29	28.4
PHS	-.370	3.94	1.0
HSG	-.395	20.14	50.1
GED	-.120	3.49	7.1
AFQT	-.011	17.72	50.0
Age 20P	.136	5.91	21.1

-2LLR	863.6
DF	10
N	24955
Mean DV	27.1%

TABLE A-5

PROBITS FOR SCHOOL GUARANTEES WITH AFQT ASVAB TESTS

DV = 1 yr Loss

Variable	MLE	t	Mean
C	.076	1.40	--
Wht	.009	.36	88.8
Dep	-.100	4.24	87.5
Depmos	-.035	12.82	3.74
Marry	.189	5.12	3.9
Waiver	.002	.09	22.9
PHS	-.494	9.98	2.9
HSG	-.542	25.67	76.6
GED	-.295	9.30	7.5
WK	.0012	1.09	55.75
AR	-.0063	5.77	55.57
SP	-.0049	5.96	53.41
Age 20P	.122	6.34	25.0

-2LLR	1496.9
DF	12
N	42235
Mean DV	14.7

TABLE A-6

PROBITS FOR NON-GUARANTEES WITH AFQT ASVAB TESTS

DV = 1 yr Loss

Variable	MLE	t	Mean
C	.285	4.42	--
Wht	.099	4.38	80.4
Dep	-.058	2.85	52.6
Depmos	-.026	4.84	1.11
Marry	.286	6.08	3.2
Waiver	-.070	3.62	28.4
PHS	-.394	4.20	1.0
HSG	-.363	18.64	50.1
GED	-.118	3.44	7.1
WK	-.0056	4.64	49.7
AR	-.0096	7.97	49.3
SP	-.0001	6.32	51.3
Age 20P	.110	4.79	21.2

-2LLR	724.2		
DF	12		
N	24955		
Mean DV	27.1%		

PROBITS FOR SCHOOL GUARANTEES WITH NON-AFQT ASVABs

DV = 1 yr Loss

Variable	MLE	t	Mean
C	.185	3.49	--
Wht	.032	1.30	88.8
Dep	-.099	4.20	87.5
Depmos	-.035	12.68	3.75
Marry	.180	4.87	3.9
Waiver	-.007	.39	22.9
PHS	-.443	8.88	2.9
HSG	-.519	24.44	76.6
GED	-.289	9.11	7.5
MK	0.0089	8.96	55.3
EI	.0055	4.07	55.9
MC	-.0050	4.15	54.7
GS	-.0026	2.18	55.9
SI	-.0033	2.65	53.6
AI	.0016	1.28	53.1
Age 20P	.114	5.88	25.0

-2LLR	1615.1	
DF	15	
N	42235	
Mean DV	14.7%	

TABLE A-8

PROBITS FOR NON-GUARANTEES WITH NON-AFQT ASVABs

DV = 1 yr Loss

Variable	MLE	t	Mean
C	.444	7.63	--
Wht	.114	4.37	80.4
Dep	-.056	2.78	52.6
Depmos	-.024	4.52	1.11
Marry	.278	5.89	3.2
Waiver	-.072	3.70	28.4
PHS	-.334	3.54	1.0
HSG	-.339	12.42	50.1
GED	-.101	2.94	2.1
MK	-.0099	8.76	48.4
EI	-.0045	2.99	50.7
MC	-.0029	2.15	48.8
GS	-.0042	3.20	48.8
SI	.0007	.49	49.7
AI	.0016	1.21	49.3
Age 20P	.010	4.32	21.1

-2LLR	855.5
DF	15
N	29955
Mean DV	27.1%

TABLE A-9

PROBITS FOR SCHOOL GUARANTEES WITH WAIVER TYPES

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.269	6.09	--
Wht	.069	2.77	88.8
Dep	-.096	4.07	87.5
Depmcs	-.036	13.28	3.74
Marry	.179	4.85	3.9
Minor	.036	.84	3.2
NMin MD	-.056	1.42	3.8
Felony	-.111	1.12	0.6
Abuse	-.002	.07	9.9
Phys/mental	.048	1.39	4.8
PHS	-.432	8.70	2.9
HSG	-.525	24.79	76.6
GED	-.287	9.02	7.5
Age 20P	.148	7.69	25.0
MG1	-.491	7.73	2.5
MG2	-.425	11.06	24.6
MG3U	-.308	7.94	18.4
MG3L	-.235	6.48	37.0
MG4A	-.108	2.77	12.9

-2LLR	1559.5
DF	18
N	42235
Mean DV	14.7%

TABLE A-10

PROBITS FOR NON-GUARANTEES WITH WAIVER TYPES

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.266	9.54	--
Wht	.124	5.43	80.4
Dep	-.041	2.02	52.6
Depmos	-.029	5.50	1.11
Marry	.291	6.17	3.2
Minor	.002	.03	2.8
NMinor	.017	.42	4.9
Felony	.042	.46	0.9
Abuse	-.086	3.00	11.1
Phys/mental	-.063	1.98	8.3
PHS	-.381	4.05	1.0
HSG	-.400	20.11	50.1
GED	-.132	3.83	7.1
Age 20P	.131	5.66	21.1
MG1	-.778	3.37	0.2
MG2	-.472	10.19	4.7
MG3U	-.465	11.65	6.6
MG3L	-.325	13.96	34.3
MG4A	-.191	8.19	28.3

-2LLR	842.7
DF	18
N	24955
Mean DV	27.1%

A-10

TABLE A-11

PROBITS FOR SCHOOL GUARANTEES WITH GED QUALITY

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.269	6.13	--
Wht	.069	2.74	88.8
Dep	-.095	4.04	87.5
Depmos	-.036	13.31	3.74
Marry	.182	4.93	3.9
PHS	-.429	8.64	2.9
HSG	-.524	24.75	76.6
GQ1	-.518	4.53	0.5
GQ2	-.285	8.27	5.9
GQ3	-.199	2.69	0.9
GQ4	-.291	2.01	0.2
Age 20P	.147	7.66	25.0
MG1	-.492	7.75	2.5
MG2	-.425	11.06	24.6
MG3U	-.309	7.95	18.4
MG3L	-.235	6.49	32.0
MG4A	-.109	2.78	12.9

-2LLR	1559.1
DF	16
N	42235
Mean DV	14.9%

TABLE A-12

PROBITS FOR NON-GUARANTEES WITH GED QUALITY

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.277	10.10	--
Wht	.123	5.40	80.4
Dep	-.039	1.90	52.6
Depmos	-.029	5.36	1.11
Marry	.293	6.22	3.2
PHS	-.387	4.11	1.0
HSG	-.402	20.27	50.1
GQ1	-.254	1.57	0.3
GQ2	-.151	3.95	5.6
GQ3	-.073	.84	0.9
GQ4	.061	.39	0.3
Age 20P	.130	5.64	21.1
MG1	-.788	3.42	0.2
MG2	-.479	10.39	4.7
MG3U	-.469	11.78	6.6
MG3L	-.327	14.12	34.3
MG4A	-.194	8.31	28.3

-2LLR	832.5		
DF	16		
N	24955		
Mean DV	27.1%		

TABLE A-13

PROBITS FOR SCHOOL GUARANTEE RTC SURVIVORS
WITH A SCHOOL ATTENDANCE

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-.373	5.61	--
Wht	.169	4.66	89.0
Dep	-.031	0.99	88.0
Depmos	-.038	9.81	3.81
Waiver	.001	.05	22.7
PHS	-.187	2.79	2.9
HSG	-.295	9.91	78.0
GED	-.088	2.08	7.4
Age 20P	.082	3.19	24.6
MG1	-.056	.63	2.6
MG2	.014	.25	25.3
MG3U	.029	.49	18.6
MG3L	.005	.09	36.6
MG4A	.018	.30	12.5
A Attend	-1.108	41.62	91.6

-2LLR	2309.6
DF	14
N	38636
Mean DV	6.8%

TABLE A-14

PROBITS FOR NON-GUARANTEE RTC SURVIVORS
WITH A SCHOOL ATTENDANCE

DV = 1 yr Loss

Variable	MLE	t	Mean
C	-1.170	28.57	--
Wht	.133	4.05	80.4
Dep	-.018	.66	53.9
Depmos	-.031	3.98	1.15
Waiver	-.026	1.00	28.9
PHS	-.345	2.59	1.0
HSG	-.323	11.83	52.0
GED	.008	.19	7.3
Age 20P	.093	2.93	20.9
MG1	-.159	.55	0.2
MG2	.118	1.96	5.2
MG3U	.078	1.47	7.2
MG3L	.118	3.48	35.6
MG4A	.084	2.44	28.1
A Attend	-.214	8.11	35.5

-2LLR	372.8	
DF	14	
N	20418	
Mean DV	10.9%	

TABLE A-15

PROBIT SCHOOL GUARANTEES

DV = ATTEND A SCHOOL

Variable	MLE	t	Mean
C	.311	.039	–
Wht	.022	.024	.889
Dep	.088	.024	.880
Depmos	.031	.003	3.776
Marry	-.104	.039	.039
SG	-.103	.022	.445
X6YO	.064	.027	.273
PSI	-.603	.031	.070
Post HS	.500	.053	.029
HSG	.556	.024	.769
GED	.295	.033	.075
Gt Lks	-.049	.019	.339
San Diego	-.067	.019	.308
AGE17	.033	.022	.158
AGE20P	-.140	.020	.250
MG1	.504	.062	.025
MG2	.431	.028	.247
MG3U	.271	.026	.185
MG3L	.161	.021	.370

DV   .344

-2 LLR   2461
DF= 18
N = 41415